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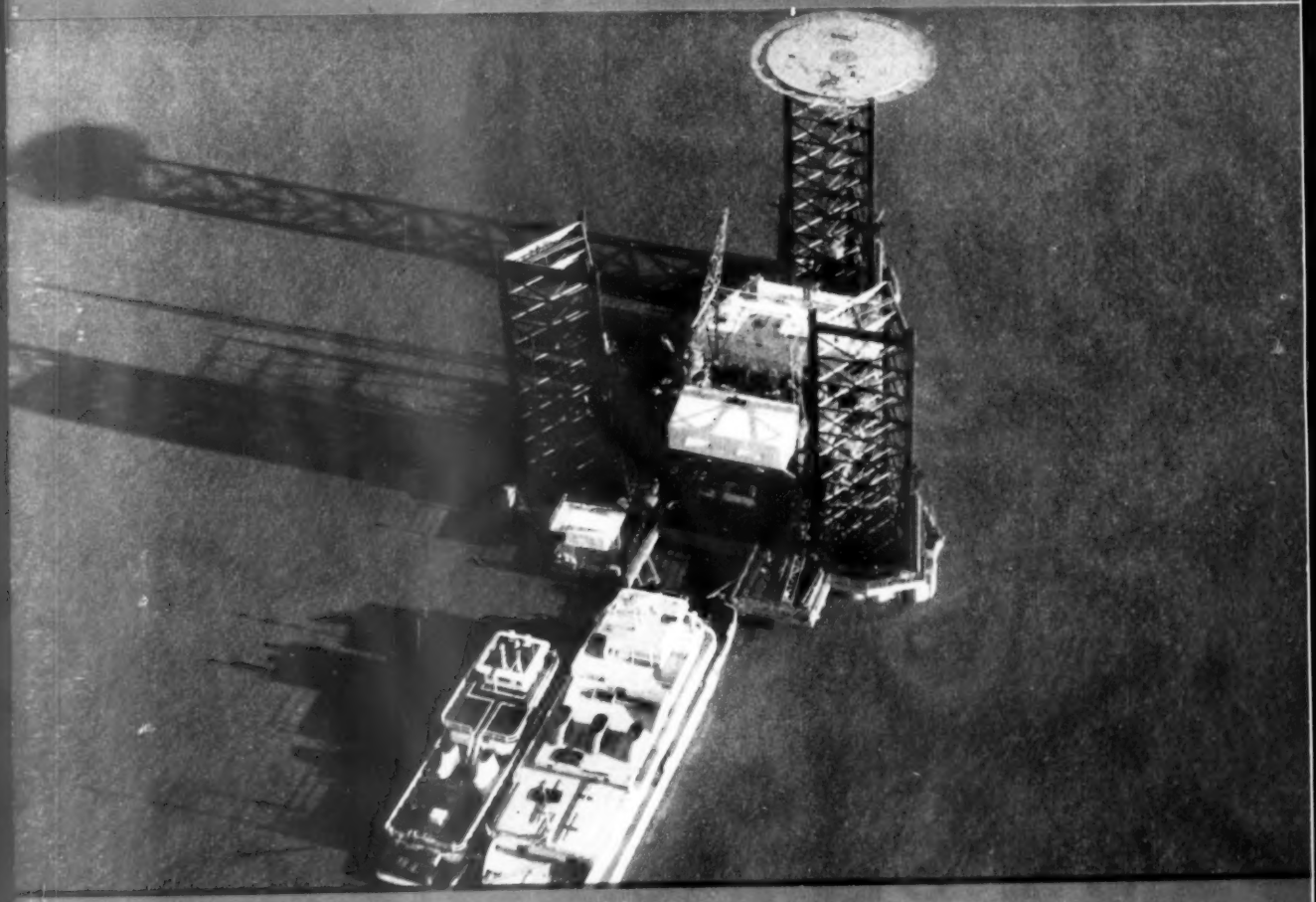
April 19, 1958

VOL. 73 NO. 16 PAGES 241-256

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Roving Rig

See Page 245

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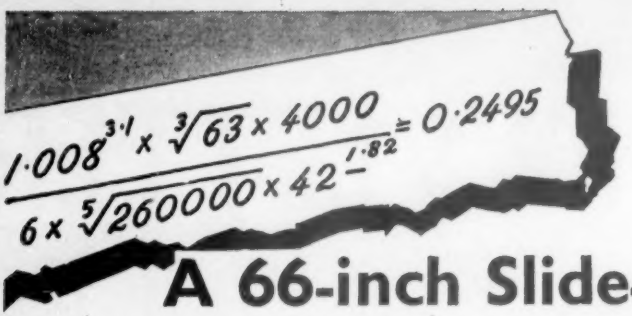

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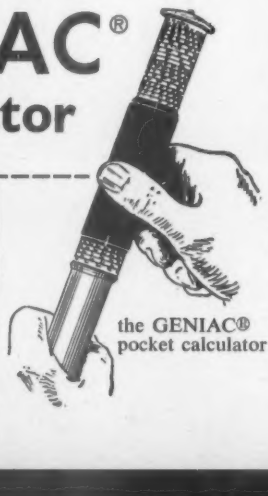

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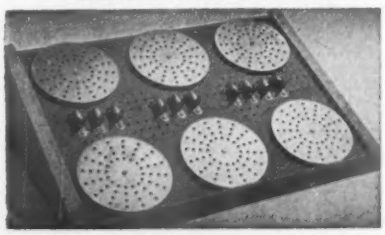

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MEDICINE

Cancer Drug Promising

A chemical compound, 5-fluorouracil, has been synthesized that is lethal to cancer cells and has proved to be successful in treating a number of different kinds of cancer.

➤ THE PROMISE of a new chemical anti-cancer drug as well as the continued success of a proven method of cancer therapy has been reported.

This new drug, which so far has shown some promise, is called 5-fluorouracil. It was synthesized by Dr. Charles Heidelberger of McArdle Memorial Laboratory of the University of Wisconsin and Dr. Robert C. Duschinsky of Hoffmann-La Roche, Inc., Nutley, N. J.

In designing the drug, Dr. Heidelberger made use of the fact that cancer cells take up a substance named uracil from the blood at a much faster rate than normal cells.

Since the substance was found to be utilized for synthesis of nucleic acid by both kinds of cells, Dr. Heidelberger reasoned that the uracil molecule might be altered to produce a chemical lethal to cancerous cells while leaving normal cells unharmed.

One drawback of the drug is its extreme toxicity, Dr. Heidelberger's co-worker, Dr. Anthony R. Curreri of the Cancer Research Hospital at the University told a group of science writers on a tour sponsored by the American Cancer Society. When handled properly, he added, it has proven to be highly successful in treatment of breast, ovary, gastro-intestinal and transitional cell cancers. However, he claims no regression due to the chemical.

Dr. Curreri explained that all available evidence has led him to believe that the state of extreme toxicity must be reached before treatment becomes effective.

Continued success in the field of chemosurgery for removal of facial and other skin cancers was reported by Dr. Frederic E. Mohs, director of the chemosurgery clinic, University Hospitals, University of Wisconsin.

Data at this time show that of 2,888 cases of skin cancer treated by chemosurgery, 95.5% resulted in a five-year cure, Dr. Mohs said.

Treatment of cancer of the lip, by means of chemosurgery, resulted in a 92.3% cure. The advantages which Dr. Mohs reported for this method included the low percentage of mortality.

The chemosurgery itself has been used for a number of years. It involves treating the cancer-suspected tissue with chemicals which will kill the tissue and yet preserve its microscopic appearance.

The dead tissue is then removed as a flat layer which is cut up into specimens. These removed specimens are then scanned microscopically. Since they are rapidly frozen, they may be scanned under the microscope within a matter of minutes. Thus the exact area of the remaining areas of cancer may be spotted and marked.

Further treatment is then limited to the selective area and makes it unnecessary to remove wide swaths of surrounding normal tissue, Dr. Mohs explained.

A full report of the one-year study was delivered at a meeting of the American Association of Cancer Research in Philadelphia.

Science News Letter, April 19, 1958

ELECTRONIC SURVEYING—Engineers using an electronic technique developed by Tellurometer, Inc., Washington, D. C., can be miles apart and out of sight of each other and yet measure distances with a maximum error of 11 inches in 40 miles. A surveyor, shown in the photograph, operates a small radar transmitter sending microwaves to a distant receiver. The time it takes the waves to make the round trip gives the distance.

● RADIO

Saturday, April 26, 1958, 1:30-1:45 p.m., EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Prof. John H. Flynn, director of student personnel services, Boston University College of Industrial Technology, and assistant professor of guidance, Boston University, Boston, Mass., will discuss "Using Engineers Efficiently."

MEDICINE

Lab Technique Studies "Live" Human Muscle

➤ A BREAKTHROUGH in the baffling area of neuromuscular diseases may result one day from a new laboratory technique for the study of human muscle tissues.

The technique, developed by Drs. J. B. Dillon, Dermot B. Taylor and associates of the University of California at Los Angeles Medical School, has made possible the study of the action of various drugs on small bits of muscle tissue excised during surgical operations.

Dr. Dillon recently described the experiments before the California Myasthenia Gravis Foundation meeting in Los Angeles.

Two small bits of muscle, usually obtained from between the ribs, are suspended in a saline bath and electrically stimulated. This approximates actual muscle "living conditions." With this technique the effects of various drugs on the muscle can be measured by sensitive instruments.

"The importance of the new development," Dr. Dillon explained, "is that for the first time such direct studies of contracting human muscle tissue are possible." Animal muscle tissues have, of course, been studied for years but species difference sometimes obscures vital data.

"This also opens the door to fundamental research on neuromuscular diseases of humans, such as myasthenia gravis, which have no counterpart in other species," he said. The unusual sensitivity of myasthenia muscle to curare has recently been demonstrated in the laboratory.

Dr. Dillon urged that myasthenia patients volunteer to contribute muscle specimens to the research. He said that the tiny specimens can be taken without excessive risk or discomfort.

"We hope that through such research it may be possible to find the cause and cure of this disease about which so little is known," he added.

Science News Letter, April 19, 1958

MEDICINE

X-Rays Worry Patients

Medical doctors are concerned that the patient requiring X-ray treatment or diagnosis may refuse it because of his fear of radiation damage.

➤ DOCTORS are worried because their patients are worried about X-rays and other forms of ionizing radiation.

This is clear from a sudden rash of editorials and articles written by doctors for doctors in the nation's medical journals.

Physicians have had to face patients lately who flatly refuse to undergo diagnosis or treatment if X-rays or any other form of radiation is involved.

The public's attitude has been stirred by recent publicity given to X-ray dangers, the possible harmful effects of radiation, atomic and hydrogen tests and fallout.

To counter this mounting fear, doctors argue the use of radiation as a medical tool, if handled properly, does more good than harm and saves more lives than it takes.

In the lead article of the *Journal of the American Medical Association* (April 5) Dr. George Tievsky, clinical instructor in radiology at the George Washington School of Medicine, Washington, D. C., points up the current dilemma.

"Common sense," he pleads, "demands that the practitioner view the current lay and scientific alarm about the harmful effects of ionizing radiation with a sense of proportion."

The opinion of geneticists and radiation biologists, he says, must be respected, but at the same time, the physician must place the opinions in "proper context."

The use of ionizing radiation in medicine should be approached with the same "cool sense of emotional detachment" that the doctor uses for prescribing and using other hazardous procedures. Damage to future generations, Dr. Tievsky points out, cannot be allowed to interfere with the use of radiation as long as there is no other equally satisfactory substitute.

He warns his colleagues that the doctor and the doctor alone must make the decision concerning the use of hazardous procedures on human beings. "The primary need," he says, "is for education, not for alarm."

In another article appearing in the *Journal of the Michigan State Medical Society* (March), Drs. William R. Eyler and Wendell M. Burns of the radiology department of the Henry Ford Hospital, Detroit, Mich., plead for "a reasonable attitude toward the medical use of diagnostic radiation."

"There is no question that, at the present time, the yield of otherwise unobtainable information concerning life-shortening disease and correctable life-shortening disease, far exceeds the chance of a patient succumbing from leukemia. The considerable lay publicity has almost always overlooked the great benefit derived from diagnostic radiation."

Similarly, an editorial entitled "Let's All Calm Down a Moment," appeared in a publication of the American College of Radiology. It points out:

"But some fear persists. The radiologist and radiation physicist are deeply concerned when some patients who need X-ray examinations for the diagnosis of early infections, tuberculosis, cancer, tumors, or other diseases delay them or even refuse them because of this ungrounded fear. Radiologists do not and will not perform X-ray examinations that are harmful."

Science News Letter, April 19, 1958

BIOCHEMISTRY

Oat Hull Extract Protects Teeth

➤ CANDY AND chewing gum may soon carry built-in protection against tooth decay.

If as little as one-half percent of a person's diet contains oat hull extracts, tooth decay may be reduced by half, University of Wisconsin researchers have found.

Earlier studies showed oat hulls—the coarse outer skins of the oat seeds—had a powerful protective effect against dental caries in laboratory rats. Dr. Paul H. Phillips and Fumito Taketa have now traced the protective powers of the material to a group of ten phenol type compounds and fatty acids.

The finding of this protective factor helps explain why people who eat highly refined foods generally have more decay than those eating coarser, less refined foods.

Further research is underway to find which compound, or compounds, is responsible for the action. The scientists believe the protection is a result of the bacteria-killing properties of the oat hull extracts.

Science News Letter, April 19, 1958

TECHNOLOGY

Radio Waves Replace Hand Waves in Tests

➤ RADIO WAVES have replaced the traditional hand waves used by ground crews conducting flight line tests with supersonic engines.

To make themselves heard over the din of powerful turbojet engines, without resorting to the limited vocabulary of hand wig-wag signals, ground crew personnel at Republic Aviation, Farmingdale, N. Y., operate a novel five-way radio system. This self-powered, inter-communication system, based on a development by Radio Corporation of America, consists of an ear-muff type headset receiver, a soundproofed mike, and a transistorized amplifier in a chest harness. It is operated by a portable power supply.

The engineers can stand right next to a roaring J-75 turbojet, a 15,000-pound thrust engine rated one of the world's most powerful, and talk as easily as though they were on a home telephone. Five can talk simultaneously.

The system was developed because of the complexities of ground testing the F-105 Thunderchief, the Air Force's new supersonic fighter-bomber.

Not only is the system expected to save wear and tear on the ear drums of the ground crews, but, by reducing the time normally consumed by the tests (because of the speedier communication), it will also reduce the ground engine noise in the neighborhood.

Science News Letter, April 19, 1958

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CHEMISTRY

Develop Anti-Radar Paint

A new secret anti-radar coating for airplanes has been developed by U. S. Air Force scientists that promises to revolutionize missile and aircraft detection and defense.

➤ AIR FORCE scientists have developed coatings that will allow bombers to sneak past radar warning systems with only a slight chance of detection. The still-secret anti-radar paints are expected to see wide use after they are perfected.

Defense Department officials believe the Russians are working on similar projects.

The new paints could greatly reduce the protection offered by our DEW line, the Distant Early Warning system in Canada, and the Texas tower radar warning stations in the Atlantic.

Military officials view the progress made by Wright Air Development Command scientists with mixed feelings. Although they regard the paints as a potential blessing to American air power, they believe that Russian scientists probably are at the same stage of development.

The greatest concern is over what these coatings will mean to our program of developing an anti-missile missile. Although there are several means available for spotting, tracking and taking a "lock" on an enemy intercontinental ballistic missile, radar still is the most advanced and probably the easiest to incorporate in a missile to destroy other missiles.

Our own Defense officials already plan to paint our ICBM's with anti-radar coatings if the Russians develop an anti-missile missile dependent on radar.

Although the new coatings need further improvement before they are put to wide use, one official told SCIENCE SERVICE "they are today very real and could be put to use now if we sacrificed some performance of the aircraft on which they are coated."

The new paints actually are heavy, thick coatings of radar absorbent materials and are similar to paint only insofar as they can be spread on a surface.

Nobody will say what is in the coatings, but it is known that some coatings used inside radar test chambers consist of rubber bonded to ceramics, and horse hair impregnated with carbon. Any "lossy" material, a radar engineer's term for material that causes wave loss through absorption, that can be mixed with a paint base and spread on a surface could be used. Other paints incorporate chemicals such as those in photographic emulsions to absorb radar waves and convert their electromagnetic energy into chemical energy, instead of bouncing the electromagnetic waves back to the radar station.

The problems in present anti-radar paints include their heavy weight; lack of resiliency that causes them to crack and flake off under strain; lack of resistance to rain and other weather effects; and the thickness with which they must be applied to be effective.

No paint yet developed will completely hide an object from radar, but the better paints are said to reduce greatly the chances of detection. Only certain parts of a plane need to be coated to cut down radar detection.

Science News Letter, April 19, 1958

MEDICINE

Study Smoke's Cancer Role

➤ CIGARETTE smoke may be a more important factor in lung cancer than previous tests have indicated and a new method of testing the possible cancer-producing effects of smoke is needed, three scientists report.

Cigarette smoke products, such as tars, usually have been tested cold and after an appreciable lapse of time from when the cigarette was mechanically "smoked" by a smoke collecting machine.

The new report, published in *Nature* (April 5), points out that those smoke products most likely to be possible cancer-producing agents exist only while hot and only for a few seconds. However, during their very short lifetimes the products are extremely active and possibly capable of providing the long-sought chemical step between harmless substances and cancer-producing agents.

The research was performed by Drs. M. J. Lyons, cancer research department, Royal Beatson Memorial Hospital, Glasgow, and J. F. Gibson and D. J. E. Ingram, University of Southampton.

They state that their work is based on current theories that chemical radicals existing in the very active, short-lived uncombined state may be intermediaries of cancer formation.

When atoms habitually organize themselves into identifiable groups that act as single units, they are called radicals. For example, the arrangement of one carbon and three hydrogen atoms is known as the methyl radical and can combine with many other atoms or groups of atoms to form a wide range of methyl compounds.

Normally, a radical does not exist in a free state, but is combined in a compound. However, heat, light, electricity or other chemicals can cause compounds to split momentarily, freeing the radical as a short-lived and highly active chemical unit which either recombines with the atoms from which it was split, or combines with other available atoms to form new compounds.

The British scientists measured significant amounts of free radicals present in hot smoke as it came from cigarettes. In the cooled and condensed tars they found very few free radicals.

The scientists conclude that the possible cancer-causing free radicals had recombined to a relatively inactive state by the time smoke products were used in the usual cancer studies and cannot give a true test of cigarette smoke's potential cancer-producing ability.

Science News Letter, April 19, 1958

ENGINEERING

Oil Drilling Platforms Take to the Sea

See Front Cover

➤ JULIE ANN, an offshore oil drilling platform with the longest legs—175 feet—of any platform built by its manufacturer R. G. LeTourneau, Inc., is being used in the Gulf of Mexico.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows the drilling platform being towed to its destination.

Other drilling platforms already in operation emphasize the "portability" of the machines. One took a 10,000-mile voyage to the Persian Gulf. Another may be moved 1,000 miles to a new drilling location, a move said to be more economical than switching land drilling operations 15 miles.

Science News Letter, April 19, 1958

ANTHROPOMORPHS — Rubber skinned dummies that conform to the shape, size and weight of human pilots are used by North American Aviation engineers in perfecting systems for saving pilots' lives. Electronic equipment in chest and stomach cavities records important information.

GENERAL SCIENCE

Russians Look at Future

Russian scientists make many hopeful predictions on the course of science, ranging from cosmic ships flying at 40,000 miles an hour to a disease-free environment.

➤ ROCKET-POWERED airliners flying at 10,000 miles per hour; transparent and transportable houses; a disease-free environment; self-controlling and self-checking factories and excursions to the moon.

These are some of the promises of science in the foreseeable future, according to Soviet scientists.

Guided by the new slogan, "The Future Is Being Made Today," Russian scientists have taken a peek into the immediate future in the current issue of *USSR* (No. 4), the English language Russian magazine published and sold in the United States.

This is what they predict:

1. Tomorrow's Cities—Russian houses of tomorrow, according to Academician Pyotr Rebinder, will be thin-walled, graceful structures that are easy to build, easy to transport, and simple and inexpensive to heat and to cool. They will be transparent but "strong and lasting." They will be made of a new building material that will be easy to mold, process, stamp and will assume any shape desired. Unusual cities will also be built.

2. Tomorrow's Health — Medicine, predicts Prof. Irina Lagunova, "will have been altered from a science of healing to a science of prevention, one which will have destroyed all sources of disease, and left for the physician only the problem of keeping his patients healthy." Radiant energy and high-frequency energy have already been used to destroy harmful bacteria, Prof. Lagunova points out. Radioisotopes promise complete control of every major gland of the body. "Experimental medicine in the Soviet Union has succeeded in reviving the human organism after clinical death has set in. It has been able to restore to elderly people lost hair color, memory, capacity to work, hope for longevity."

3. Tomorrow's Rocket Plane—The "airliner of tomorrow" will shoot like a rocket into outer space, taking off vertically, but landing as a conventional airplane. It will fly at heights of 600 miles and at speeds of 10,000 miles per hour. According to Vasili Alexandrov of Technical Sciences, Soviet science is rapidly developing techniques that make creation "of such planes possible."

4. Tomorrow's Machine — The complete automation of the future, claims Prof. Grigori Shaumyan, "is not only a blueprint, its development is already in process, and has been for some time." Advances in the Soviet Union, he reports, have been made that can be set to reproduce the best human control of a machine tool and function independently of an operator. One such automated device machines crankshaft pins on a lathe. Complete automation controlled electronically, Prof. Shaumyan predicts, will handle the most complicated technological processes without the need for human interference.

5. Tomorrow's Oceans—Submarine farming will help feed hungry people. Swarming masses of plankton will be scooped out of the sea to be converted into fodder for animals. The oceans' storehouse of seaweed will be tapped for food and industrial uses. "In the future not too far distant," says Lev Ze..kevich, a corresponding member of the U.S.S.R. Academy of Sciences, "we can envisage a vast and well-ordered marine economy, with minerals extracted from the ocean floor, energy from its waters, food from its rich stores of plant and animal life."

6. Tomorrow's Earth Depths—"A plentiful mineral future is foreshadowed," according to Academician Dmitri Shcherbakov, by mining the depths of the earth. "Preliminary, but successful" experimentation in Russia has already yielded basalt that can substitute for rare earths or be used as a building material. Soviet scientists have also extracted nephelite and worked out a method for wringing aluminum, potash and soda from it. "The time will come," Academician Shcherbakov says, "when the subterranean machine, working on atomic fuel independent of the surface, will penetrate deep into the bowels of the earth, breaking up and melting rock as it burrows in search of ore deposits."

7. Tomorrow's Star Flights—The plane that we know today will be replaced by "the cosmic ship which will fly at speeds varying anywhere from 40,000 to 60,000 miles per hour." A flight to Mars in the "nuclear or radiant" powered space ship will take a year. "It may very well be that within a matter of decades," Victor Kaznevsky, a design engineer, states, "our neighboring planets will no longer be offering a challenge. The distant stars will be our goal."

Science News Letter, April 19, 1958

ENGINEERING

Predict Nuclear Power Will Compete With Steam

➤ NUCLEAR POWER will be economically competitive with conventional steam plant power by 1965, a Columbia University engineer predicts.

John E. Ullmann says the cost of nuclear power would begin to compete within two years and that it would be completely competitive within ten years.

His forecast, more optimistic than most made to date, assumes that costs of conventional power in the future will rise. The prediction is reported in *Science* (April 4).

Mr. Ullmann also assumes nuclear power costs in the future will be reduced at the same rate as costs for steam power plants have decreased since 1910.

These two assumptions are then blended to produce a prediction of "break-even" points, beyond which nuclear power may be expected to have an increasing economic advantage.

Nuclear power costs could be reduced in the future, Mr. Ullmann suggests, by using higher steam working pressures, by cutting down on personnel, by developing suitable substitute materials for the present expensive ones, and by safely lowering construction standards as experience is gained.

Mr. Ullmann considered only steam-cycle nuclear plants. He did not attempt to estimate costs of direct generation fission or fusion plants but concluded that if such plants are feasible, they would "hasten the demise of the coal-fired steam plant even more."

By 1968, Mr. Ullmann predicts, even the highest cost of nuclear power will be about the same as the lowest costs of conventional steam power. That date will come sooner if nuclear power plants are put into operation at a rate faster than now expected.

However, if the construction rate for nuclear plants is lower, the 1965 date would still hold, Mr. Ullmann contends. He explains that large-scale reactors now being built in other countries, particularly in Europe and Russia, will result in reduced costs.

Mr. Ullmann estimates nuclear power will cost about 12 mills per kilowatt hour in 1960, from six to eight mills by 1965. In contrast, conventional plants, depending upon their capacity, will yield power costing from 5.75 to 14.35 mills per kilowatt hour.

Science News Letter, April 19, 1958

GEOPHYSICS

Valuable Data Being Gathered by Explorer III

➤ INFORMATION considerably more valuable than expected is being gathered by Explorer III because of its unplanned, close-to-earth orbit.

The satellite, officially named 1958 Gamma, is "completely fulfilling" its scientific mission, the National Academy of Sciences IGY committee reported. The "tremendous sweep" of the orbit, varying from 117 to 1,740 miles above the earth, is "splendid" for cosmic ray research.

The information radioed back from Explorer III almost ties into the cosmic ray data from vertical rocket firings. The transmitters and tape recorder are working properly, according to Dr. James A. Van Allen, member of the IGY committee's technical panel on the earth satellite program.

Information on temperatures and micrometeorites, as well as on cosmic rays, is being continuously telemetered to earth by the satellite's low-power transmitter.

Science News Letter, April 19, 1958

Existing methods for *television* transmission require the equivalent of 1,000 telephone circuits for one video channel.

MEDICINE

Study Salt Intake

Studies of both animals and the diets of different populations has led one scientist to conclude that too great a salt intake can be harmful.

➤ EATING TOO much salt can cause high blood pressure.

This is the conclusion of Dr. Lewis K. Dahl of the Brookhaven National Laboratory, Upton, N. Y., who says:

"I believe there is ample evidence to indicate that salt is primary in the cause of 'essential' hypertension (high blood pressure) which, after atherosclerosis, is the commonest form of cardiovascular disease in western society."

Dr. Dahl's findings and conclusions, which are at odds with all those that recommend salt be added to diets as beneficial to man, are based on animal experiments, hospital experiments and study of populations with both high and low salt intake.

Although Dr. Dahl thinks it would be a healthy idea for the population generally to restrict its salt intake, he is not prepared at present to recommend tolerance levels.

Averages, he believes, are meaningless and the salt intake of each individual is what is important. If he were pressed for a guess at what would be a safe level, he might recommend from one to four grams (.035 to .14 ounces) per day or less as a maximum. But, he emphasizes, much more research into the how and why of salt as it relates to hypertension is necessary.

Dr. Dahl's studies and those of others have led him to the following conclusions and predictions:

1. A low-salt diet is associated with normal adrenocortical function.

2. A high-salt diet is associated with a markedly increased incidence of hypertension and cerebral apoplexy.

3. Evidence suggests high salt intake is a cause of, and not caused by, the hypertension.

4. Sharp reductions of current levels of salt intake could be carried out without harm and probably with great benefit, by reducing the incidence of hypertensive cardiovascular disease.

5. Wherever low-salt diets prevail (that is, less than about two grams, or .07 ounces, of sodium chloride per day) hypertensive cardiovascular disease will be uncommon.

6. Conversely, where high-salt diets (that is, more than perhaps five grams, or .175 ounces, of sodium chloride per day) are the rule, hypertension and its complications will be frequent.

The findings on salt and hypertension seem equally applicable to the etiology of eclampsia, a severe complication occurring in the later stages of pregnancy marked by intermittent convulsions followed by an ever deepening coma.

Many of Dr. Dahl's conclusions are based on studies of various populations. He reports, for example, that southern Negroes of the United States have several times as much hypertension as the southern whites.

"My interviews with Negroes from that region," he says, "indicate that for most of them salted pork in one form or another has been a prominent article in the diet from early childhood."

Similar examples have been reported for peoples in Japan, the West Indies, China and Egypt.

Presently Dr. Dahl is in Japan studying the salt intake of groups there, where there is both a generally genetically pure population and a generally stable diet. This will permit him to compare the effects of the use of pure salt on foodstuffs and its subsequent role in hypertension.

A preliminary report on salt intake, adrenocortical function and hypertension appeared in *Nature* (April 5) and a second report is forthcoming shortly. The work was carried out under the auspices of the U. S. Atomic Energy Commission.

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BETTER ANESTHESIA—Dr. C. R. Stephen (center), professor of anesthesia, Duke Medical Center, Durham, N. C., administers Fluothane to a youthful surgical patient. Dr. Stephen was one of the first American investigators to use the new non-explosive anesthetic.

EDUCATION

More Money Needed To Train Doctors

➤ FROM $10,000,000 to $20,000,000 a year more than is now being spent is needed to train the nation's doctors adequately.

If sufficient private support is lacking, medical schools will have to seek Federal aid, the National Fund for Medical Education concludes after studying the problem. The Fund has issued a 4,000-word annual report entitled "Medical Manpower for Tomorrow."

The crisis is largely the medical schools' fault, growing directly out of the tremendous scientific strides made by the schools, the Fund reports.

Lack of funds shows most clearly in the unfilled faculty posts, 331 in 1956-57 compared to 251 the previous year. Lack of funds also cuts down on the amount of basic research performed at medical schools.

Science News Letter, April 19, 1958

SURGERY

Fluorinated Hydrocarbon Anesthetic Non-Explosive

➤ A POTENT, non-explosive anesthetic named Fluothane has been introduced to aid U. S. surgery.

A fluorinated hydrocarbon first synthesized in England in 1951 as trifluorobromchlorethane, it is said to have many advantages over ether and chloroform. It has been successfully used in 20,000 clinical trials in England, Canada and the U. S. since 1956.

According to Dr. John B. Jewell, medical director of Ayerst Laboratories, New York City, which introduced the anesthetic, it has been used successfully in almost all known operative procedures in patients of all ages and conditions.

Fluothane has exhibited essentially no adverse side effects such as nausea or vomiting, and emergence from the anesthetic is very rapid. Because of its non-explosive nature, Fluothane will permit wider use of modern electrical equipment in advanced operative procedures.

Science News Letter, April 19, 1958

CHEMISTRY

Ocean Waters May Yield Vital Metals

➤ THE OCEANS of the world may some day provide the major supply of the currently strategic metals, niobium and vanadium, just as they now provide the bulk of magnesium.

Scientists at Plymouth, England, have found appreciable quantities of both metals in the flesh and blood of ascidians, a family of sea animals represented by the familiar skate.

Evidence indicates niobium, at least, is absorbed in some way by the animals from sea water, Drs. D. B. Carlisle and L. G. Hummerstone, Marine Biological Association Laboratory, Plymouth, report in *Nature* (April 5).

Niobium, sometimes called columbium, and vanadium recently have achieved importance in hardening high-quality steel and in making aircraft steels corrosion resistant and more useful at very high temperatures.

Without predicting the possibility of large-scale extraction from sea water, the scientists reported that samples taken from Plymouth Sound and from a point about 25 miles from Plymouth contained appeciable and varying amounts of the metals.

In an earlier report to *Nature* (March 29), Dr. Carlisle suggested vanadium known to exist in petroleum deposits came from the same salt-water animals that, upon decay, may have formed the petroleum.

Science News Letter, April 19, 1958

PSYCHOLOGY

Continuous Mothering Found Unnecessary

➤ "CONTINUOUS mothering" is not essential for a child to develop a healthy relationship with his parents.

This is the conclusion of Dr. Albert I. Rabin, head of Michigan State University's psychological clinic, who reports some young parents may have an "exaggerated fear" of being separated from their child for even short periods of time.

The psychologist explains that "a child can grow up to have a healthy attitude toward his parents even though not continuously with them."

"In fact," says Dr. Rabin, "some children may do better if reared apart from their parents. In this way whatever resentment which might develop is drained off toward the nurses and teachers instead of the parents."

Dr. Rabin bases his findings on a year of research he conducted in the Kibbutzim, or collective settllements, in Israel.

The Kibbutzim are voluntary groups in which the parents must work for the community during the day. Young people are eligible to become full-fledged members of the community at 19 years of age.

In the settlements the children eat, sleep and grow up in the community's nurseries and schools. The only contact with their parents is usually two or three hours in evening but at that time the parents can give undivided attention to their children.

Dr. Rabin's studies indicate that, despite limited contact with their parents, the Kibbutz children in general developed a positive attitude toward their parents. In some instances the attitude was found to be even more positive than in many ordinary families.

One possible explanation, according to Dr. Rabin, may be that in ordinary families the children may resent the demands, rules and discipline as laid down by the parents. In the Kibbutz it is the nurses and teachers, not the parents, who make the demands.

The Kibbutz children also showed a highly developed knack of teamwork and few neuroses.

Science News Letter, April 19, 1958

MEDICINE

"Salt Free" Foods May Contain Harmful Sodium

➤ "SALT FREE" foods still can be dangerous to heart patients on sodium-restricted diets.

The warning is contained in three new booklets intended for adult heart patients placed on a sodium-restricted diet by their physicians. The booklets are being made available to doctors by the American Heart Association or can be picked up at a local heart association on a doctor's prescription. They are designed to help the patient follow a strict, moderate or mild sodium restriction prescribed by a physician.

Read the fine print on the labels of food, the Association says, pointing out:

"Food identified on the label as being salt free may still contain some other sodium compound used as a preservative or as an aid to processing."

The booklets explain that sodium is not salt, but salt, known chemically as sodium chloride, is nearly half sodium.

In addition to salt, sodium compounds are often added to foods in processing or for preservation in the form of baking powder and baking soda, brine, di-sodium phosphate, monosodium glutamate, sodium alginate, sodium benzoate, sodium sulfite, sodium hydroxide and sodium propionate.

Some medicines also contain sodium, the booklets caution, and heart patients on sodium-restricted diets should check with their doctors before using any unprescribed medicine, "even a headache or cough remedy or a laxative."

The booklets also provide food lists that enable the patient to vary his meals as he becomes familiar with his basic diet plan.

Sodium is essential to life and everyone requires a certain daily amount. Normal persons have a built-in mechanism for getting rid of excess amounts of sodium. In some forms of cardiovascular disease where the body retains water, however, the extra sodium not only stays in the body but holds the water there too. To prevent this accumulation of sodium and water, sodium in the diet is kept down to approximately what the body actually needs. (See p. 247.)

Science News Letter, April 19, 1958

IN SCIENCE

PHYSICS

Devise Simple Method For Measuring Fallout

➤ A SIMPLE METHOD for continually measuring radioactive fallout from nuclear tests, devised by a Czechoslovakian scientist, has been reported.

The method is based on the relation between the charge on a conductor and the rate this charge is lost in ionized air, a relation first set down by C. A. Coulomb in 1795. The simple measuring device, based on this relation, was developed by Dr. F. Behounek, Faculty of the Technical and Nuclear Physics, Charles University, Prague.

It consists of a piece of isolated aluminum wire screwed on the charging contact of a pocket electrometer. To measure the currents found in the vicinity of radioactive materials, the electrometer is supported by a very light wire frame in the form of two parallel "X's" connected by a cross wire.

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PALEONTOLOGY

Bird Fossil Bones Bring Pliocene Into Focus

➤ THE PLIOCENE period of history—1,000,000 to 3,000,000 years ago—is being brought into sharper focus by the study of fossil bird bones from San Diego County, California.

This is the conviction of Dr. Loye Holmes Miller, professor emeritus of biology at the University of California at Los Angeles, who has studied the San Diego fossil birds for the past 15 years.

"We have considerable information on the Pleistocene period, running back to 1,000,000 years ago, and we know quite a bit about the Miocene period, 3,000,000 to 5,000,000 years ago," he points out. "But the 'in-between' period—the Pliocene—has been somewhat less well known.

"Now, like the emerging lines of a photographic plate, we are beginning to learn what the picture was during the Pliocene."

In *Contributions in Science*, published by the Los Angeles County Museum, Drs. Miller and Robert I. Bowman discuss 73 Pliocene fossil bird specimens. Dr. Bowman, who took his Ph.D. degree at the University of California, Berkeley, is now at San Francisco State College.

The bones were found in rock formations east and north of the center of San Diego where highways have been cut through.

They include species resembling many modern marine birds: loons, grebes, shearwaters, boobies, cormorants, murrelets and auklets. Previously, an early relative of the barn owl was described from the same deposit.

Science News Letter, April 19, 1958

CE FIELDS

NATURAL RESOURCES

Expanding Population Needs More Wood

➤ HALF AS MUCH wood as we have today may be the plight of Americans living 40 years from now.

There is just so much land, 489,000,000 acres of it, on which Americans grow the wood needed for homes, industry, packaging and synthetics. With the U. S. population due to increase some 100,000,000 persons by the year 2000, we will have to double our timber production.

"If Americans are to have the timber they need in the years ahead we must begin to put our forest house in better order," Richard E. McArdle, chief of the Forest Service, warns.

"The potential of the land is adequate," he points out in a book entitled *Timber Resources for America's Future.*

The 700-page book, representing the most complete appraisal ever made of the nation's timber situation and probable timber demands for the future, contains facts and figures that point to ways we can increase our timber supplies.

The best possibilities are:

1. Plant billions of trees each year instead of millions. Some 52,000,000 acres are unemployed today where they could be producing timber. Additional millions of acres are producing below capacity.

2. Step up control of fire, insects and disease. One-fourth of the net growth in timber is destroyed each year by these agents. This is more than is cut for all timber products.

3. Use more dead and cull trees and more of the timber cut now that is being left in the woods and mills. Billions of board feet of timber are wasted. Intensified research could find uses for this wood.

4. Keep recently cut lands highly productive.

Science News Letter, April 19, 1958

PSYCHIATRY

Mental Hospital Has Plan For "Working Patients"

➤ A METHOD whereby recovered patients live-in at the mental hospital yet hold down daily jobs outside may help both patient and hospital.

The advantages of this scheme are many, Drs. Frederick B. Charatan, Herman C. B. Denber and John H. Travis of Manhattan State Hospital, New York, and Columbia University's College of Physicians and Surgeons, point out.

Patients can be observed while actually in the work situation. They also have a large audience—nurses, physicians and other patients—interested in their success. The change from the shelter of the hospital to the stress of normal life is also made less abrupt, helping to forestall relapse.

Nurses are able to give more time to remaining patients and, the researchers believe, the time spent by the patients in the hospital is reduced in the long run.

Since August, 1957, the researchers report in the *American Journal of Psychiatry* (April), ten selected female patients from Manhattan State Hospital have been encouraged to work in the city while continuing to reside at the hospital. Three of the patients, among whom were schizophrenics, psychopaths and alcoholics, have left the hospital and are still at work. Two continue to live-in while going to work daily, two have lost their jobs, two have relapsed and one is still seeking work.

The researchers plan to start a "sheltered workshop" at the hospital where patients may be trained in good work habits against the time of their eventual discharge.

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GEOPHYSICS

Need Do-It-Yourself Moon Tracking Stations

➤ A CHAIN of small, do-it-yourself satellite tracking stations scattered across the United States is needed to photograph and record data on present and future satellites.

This is the belief of William Culver, a 30-year-old graduate student in physics at the University of California at Los Angeles, who has shown how it can be done.

Using a second-hand 35mm. camera, Mr. Culver made his photographic mark in the early days of sputnik I when he took some of the most accurate photographic sightings in the country, according to Dr. Fred Whipple, director of the Smithsonian Astrophysical Observatory.

"The powerful cameras of the observatories are excellent, but they are too far apart to catch everything," Mr. Culver said.

"Small scattered stations might well catch the final plunge of a satellite or rocket into the atmosphere which would probably be missed by a distant observatory.

"It is somewhat like air defense—we have radar nets but we still need men and women to scan the sky."

A basic station can be set up for less than $300 with some ingenuity and judicious second-hand buying, Mr. Culver said, and points to his own backyard station.

His home-made camera consists of a plain wooden box surmounted by a war surplus aerial reconnaissance lens ($40), a plate holder in back ($25), a cardboard viewer attached with Scotch tape in front, and a three-quarter-inch pipe on either side of the box. The pipes screw into a gimbal ($10), a contrivance that allows the camera to swing in any direction. The whole invention is attached to two stout posts behind his home.

The major expenses are a second-hand shortwave receiver ($70) to pick up the continuous time signals from the National Bureau of Standards time station and a tape recorder (about $150), which can record the exact time that the satellite's picture is taken.

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MANPOWER

Suggests Baseball Farm System for Engineers

➤ A BASEBALL farm system for young engineers has been recommended.

If engineering companies used baseball's farm system, they would go a long way in solving some of their manpower problems, Prof. John H. Flynn, assistant professor and director of student personnel services at Boston University's College of Industrial Technology, declared.

"Adoption of the present major league baseball farm system, whereby major companies would farm out young, promising engineering personnel to subcontracting smaller companies for general seasoning, has distinct possibilities.

"Such a system would permit a step-by-step advancement in scientific maturity, as well as provide continuous information on an individual's research and laboratory capabilities," he said.

The manpower expert suggested American industry needs to stress better methods of recruiting new scientists, as well as stemming the high turnover once it has employed them.

"The answer to our lack of trained scientific minds is not really how to push more young men through college, but rather how to properly pull results from the many talents we already have available to our national economy," Prof. Flynn said.

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ICHTHYOLOGY

Sunburned Salmon Helped by Vitamin

➤ A SUNBURNED salmon, skin peeling and discolored, with "blisters" and lesions on its back, can be helped. A daily diet that includes niacin can put the sick salmon back on the road to recovery within two months.

Successful hatchery operation is extremely important for the continuation of the Columbia River salmon fishery and other fisheries, including trout. However, sunburn has been plaguing the fish biologists for a long time, accounting for a high death rate among young salmon.

Experiments conducted by the Fish and Wildlife Service's nutrition laboratory at Cook, Wash., indicate that diets deficient in niacin are correlated with sunburn in salmon. Scientists found fish fed a niacin-deficient diet for 30 days developed bad sunburns. Fish already sunburned which were fed a diet that included niacin for 60 days recovered almost completely, although they were kept under the same light conditions.

In the wild, fish are protected from sunburn by stream cover, deep pools and a niacin-rich diet.

Recognition of the cause of sunburning in fish will have "far-reaching benefits" in hatcheries throughout the country, as well as in the salmon restoration program, the Fish and Wildlife Service said.

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TECHNOLOGY

Revolution in Liquids

Liquids are being packaged to behave like powders. Contained in millions of capsules of microscopic size, they promise to revolutionize drugs and computing machines alike.

By CHARLOTTE MOOERS

➤ LIQUIDS CAN now be packaged so that they behave like powders. This is the secret of the "No Carbon Required" business forms now coming into use. Powdered liquids promise exciting developments in the near future in such different fields as drugs and computing machines. Farther ahead is a possible revolution in photography, and a way of imitating some of the properties of living cells.

The technique of turning liquids into powders was developed at the National Cash Register Company, in their research laboratories in Dayton, Ohio, and is the result of a 12-year program of research.

Liquid is first broken up into droplets of microscopic size, and each droplet is then coated with a thin layer of gelatin. The droplet thus becomes a capsule a millionth of an inch in diameter, similar to the capsules containing drugs or vitamins that are sold in drugstores, but very much smaller. Millions and millions of tiny capsules form a fine powder that appears perfectly dry to the touch, although actually it is 70% liquid and only 30% gelatin coating.

Inside its tiny capsule the droplet of liquid is protected from air and contamination. Liquid can be stored this way for indefinite periods of time, and then released when wanted by crushing or dissolving the capsule.

Multi-Use Units

These microscopic storage units can be used in many ways. A capsule may be a temporary package holding drugs, dyes or perfumes until they are ready to be used. It may be a permanent memory unit of an electronic computing machine. Eventually, it may be a test tube carrying out chemical reactions, or a tiny electric cell.

The first commercial application of capsule powders is the NCR, "No Carbon Required," paper that makes carbon copies without carbon paper. NCR paper has a light clay coating on its front surface and a coating of capsule powder on the back, and looks and feels much like ordinary paper. When a mark is placed by writing or typing on the top sheet of a pad of NCR paper, it is transferred immediately to the sheets underneath. What happens is that on the back of each sheet, the capsules lying directly under the mark are broken by the pressure of the pencil or typewriter key. This releases a very small quantity of a special oil that reacts with the clay on the front of the sheet beneath to form a bright blue dye.

NCR paper can go a step farther and do away with typewriter ribbons, too, if the clay and the oil-filled capsules are both coated on the front side of the paper. Erasures are impossible on this type of NCR paper, so its use is likely to be limited to teletype machines and other places where typewriters are controlled automatically.

One of the most important applications of the tiny capsules in the near future will be in the memory units of electronic computing machines.

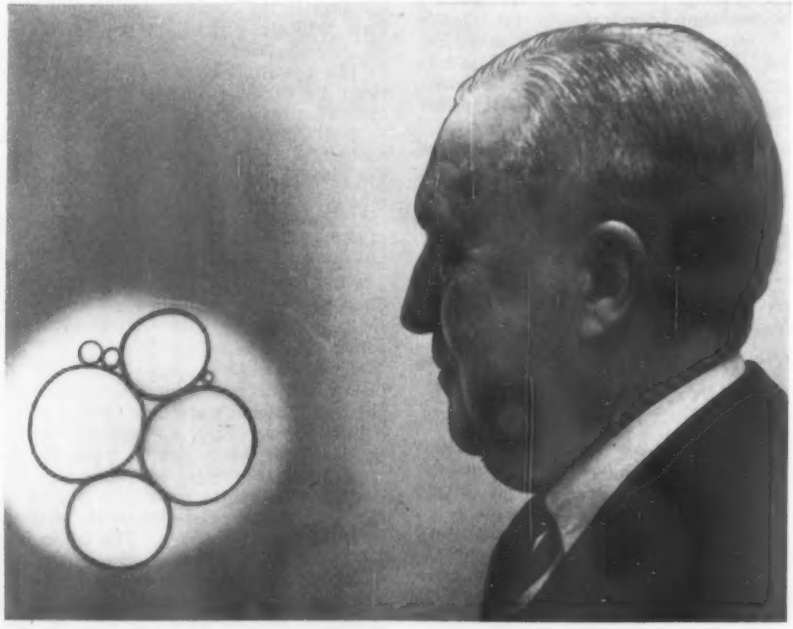
In its research program, National Cash Register Company has developed a group of oils containing dyes that are sensitive to light. Called metachromic dyes they turn brilliant blue in blue light and colorless in yellow light. As long as the dyes remain dissolved in the oil, they can change from blue to colorless and back, over and over again. Each microscopic capsule filled with oil can therefore be used as a photosensitive on-off device—the photochemical equivalent of a relay or a switch. These tiny photochemical "switches" are expected to provide a low-cost storage of information for use in computing machines.

Other possible uses for the metachromic dye capsules are in high-speed printing and photography. The metachromic dyes are sensitive to light only while they are in solution. If paper coated with capsule powder is given a photographic image by being exposed to the right kind of light, the image can be made permanent by running the paper through a roller and crushing all the capsules on the sheet. The oil evaporates, the dye is deposited on the sheet without change, and no further change occurs.

Will capsule-coated papers be the answer to the search for a method of dry photography? In the future, these tiny capsules may make it possible to take and develop a picture in a matter of seconds, with no chemicals added in the developing process. Now there are many practical difficulties, one being that the "film speed" of the metachromic dyes is very low. The first commercial use of this method is more likely to be in high-speed printers for the outputs of computing machines.

Electric Capsule

Still farther in the future is the possibility of using capsules as tiny electric cells. It is known that the transfer of water through membranes, or osmosis, can create a difference in voltage between the two sides of



MAN-MADE MEMORY—The human mind observes a laboratory microscopic projection of a man-made memory. Stanley C. Allyn, chairman of the board of The National Cash Register Company, looks at capsules resembling the minute cells that form the nucleus of a new type of chemical memory system being developed by the company.

the membrane, and electric cells have been built from distilled water and gelatin. National Cash Register Company has a research program on these devices. If it becomes possible to develop a small voltage in a tiny, millionth-of-an-inch capsule filled with water or a water solution, and to use this voltage to affect neighboring capsules in a useful way, a whole new field of technology may be opened up.

Such a technology would be closer in size and structure to the complex technology of living matter than anything man has yet devised. Thus the tiny capsules originally developed for use in business records may some day prove to be another step in the design of computing machines as small and as versatile as a "brain," or chemical factories as silent and as efficient as a tree.

Foods in Capsules

Further uses for capsule powders in the field of foods and drugs have been suggested.

Liquid coffee in capsules would retain all it odor and flavor until it was ready for use. Unstable drugs could be protected by encapsulation. Perfume capsules could be coated on facial tissues, with the scent released when the tissue was rubbed on the skin.

Distilled water may be encapsulated to protect its purity. Air-in-capsules might be used to create tiny air pockets in materials to increase their buoyancy.

Adhesives containing an activator in capsules could not harden until the surfaces to be cemented were pressed together and the capsules broken.

The NCR paper is the only commercial application of capsule powders at present. However, a laboratory demonstration of a computing machine memory has been made and a prototype of a practical working memory is expected to be completed within a year.

The computing machine memory will consist of a revolving drum whose surface is coated with capsule powder containing the light-sensitive metachromic dyes. Marks will be made on the surface of the drum by blue light, read by photoelectric cells, and erased by yellow light.

Prodigious Memories

Since the capsule coatings have a million capsules to the square inch, the number of marks, or "bits" of information, that can be stored in a memory of this kind is potentially enormous.

If each capsule could be used for one bit of information, the entire contents of a book could be recorded on a square foot of paper. Practically, the very large number of capsules means that the number of bits per square inch will be limited only by the resolution of the optical system used to record, read, and erase the marks. There will be no limitation due to grain size, as there is in photographic film. Also, each capsule is unaffected by its neighbors, so the marks will not spread as they do in photographic emulsion or on magnetic tape.

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ASTRONAUTICS

Ions to Power Space Ships

➤ INTERPLANETARY rocket ships powered at fantastic speeds by the tiny thrust of streams of electrically charged matter have been shown to be practical by at least one formal Air Force study of proposed ion-powered rockets.

Until now, discussions of future ion-drive rockets have been based mostly on speculation, hope and informal studies.

Detailed results of one formal study made under an Air Force contract were revealed to the national aeronautic meeting of the Society of Automotive Engineers by R. H. Boden, Rocketdyne Division of North American Aviation, Inc. These results show an ion rocket engine "has the capability of producing usable thrust levels and will supplement other rocket engines in applications to space vehicles," Mr. Boden reported.

On April 5, 1957, two Rocketdyne research engineers, Martin I. Willinski and Mrs. Elsie C. Orr, described their proposal for such a space ship to a meeting of the American Rocket Society. At the same time, the Air Force Air Research and Development Command announced the contract to study ion-drive possibilities. (See SNL, April 20, 1957, p. 249.)

An ion-powered rocket would be given thrust by a stream of ions, electrically charged atoms and molecules, ejected at high speed from the rear of the ship.

The thrust, or working force, produced by an ion drive would be very small, but would be sufficient to maintain the rocket at tremendous speeds through space once the ship had been accelerated to a high speed and pushed into the near vacuum of outer space by more conventional rocket engines.

Scientists studying possible ion-drive mechanisms, not only at Rocketdyne but also at other private and Governmental research centers, still are engaged primarily in "basic research" and have not yet reached the "applications" stage.

"The state of the art in the ion rocket engine is in the pre-engineering phases," Mr. Boden said, adding that "three major problem areas exist in the development of the ion rocket engine."

The problems involve the propellants that will be ionized and ejected to provide thrust; the thrust chamber; and the development of the appropriate electrical generator to accelerate the ions.

He reported programs can now be set up for solving these problems.

Mr. Boden revealed the research program is scheduled to continue for another year and is to be expanded to include "a limited experimental program" in addition to theoretical work.

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PHYSIOLOGY

Treat Baby Heart Failure

➤ CONGESTIVE heart failure accounts for between 10% and 20% of all cases of heart disease in infants and children, and the majority of these cases is due to congenital, prenatal, heart disease, a San Francisco physician reports.

Immediate treatment is hampered by the difficulty in properly diagnosing heart failure because the symptoms, in the infant or child, resemble those of infection and are many times wrongly interpreted.

Symptoms which should be watched and which might mean a condition of heart failure are:

1. Rapid respiration—normal respiration at birth is about 40 per minute. It may range up to 100 and still not be identified as an abnormality.
2. Hepatomegaly—the liver is greatly enlarged and may be felt at the navel.
3. Enlarged heart.
4. Rapid heart beat. Any pulse over 120 accompanied by rapid respiration.
5. Gallop, or leaping heartbeat.
6. Abnormal respiratory sounds in the lungs.
7. Peripheral edema. Water rention in the surface skin. This is a late sign of failure in infants and children, and indicates a severe degree of failure, Dr. Saul J. Robinson explains in *California Medicine* (March).
8. Easy fatigability. This sign may be an important clue to detecting congestive failure. Often the mother notices that the infant pauses frequently to rest during feedings.

Dr. Robinson urges that these steps be considered in treating the infants for heart failure:

Treatment for the underlying condition which could mean a combination of failure plus pneumonia, infection or anemia. He strongly urges the use of antibiotics for infection and careful replacement of blood for the anemic, and use of digitalis, according to weight and age of the infant.

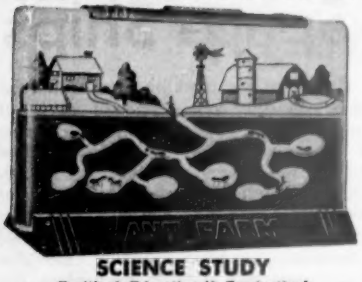
A low salt diet will control edema, water retention, a problem encountered in congestive heart failure, he points out. Increased urination should be encouraged through administration of a diuretic, and the supply of oxygen should be increased. Diet should consist primarily of fluid during early stages of treatment, and vitamins should be gradually introduced, he recommends.

Dr. Robinson cautions that cortisone and ACTH may relieve heart failure, but should be used with caution, while actual phlebotomy, or opening the veins, is seldom recommended.

The earlier the diagnosis, the more hope there is for recovery through later surgery after temporary treatment.

Science News Letter, April 19, 1958

BUSY ANTS FOR YOU!



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• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

THE ANCIENT LIBRARY OF QUMRAN AND MODERN BIBLICAL STUDIES—Frank Moore Cross, Jr.—*Doubleday*, 196 p., illus., $4.50. Telling the story of the discovery of the famous Dead Sea Scrolls and explaining their meaning. By a leading scholar in the field.

ANIMAL TAILS—George F. Mason—*Morrow*, 95 p., illus. with drawings by the author, $2.50. Telling young people some interesting and little known facts about animal tails.

ARTIFICIAL AND NATURAL PRODUCTION OF SILVER SALMON, *Oncorhynchus Kisutch*, AT MINTER CREEK, WASHINGTON — Ernest O. Salo and William H. Bayliff — *State of Washington Department of Fisheries*, Research Bulletin No. 4, 80 p., illus., paper, free upon request direct to publisher, 4015 20th Ave., West, Seattle 99, Wash. Comparing the merits of hatchery versus natural rearing.

THE BOOK OF KNOWLEDGE 1958 ANNUAL—Louise McDowell, Ed.—*The Grolier Society*, 420 p., illus., $7.50. Reviewing important events of the crowded year 1957 for family reading and including special feature articles.

CARDIOVASCULAR REHABILITATION—Paul Dudley White, Howard A. Rusk, Bryan Williams and Philip R. Lee, Eds.—*McGraw-Hill*, 155 p., $6.50. Based on papers presented at a symposium in May, 1956.

A DAY IN THE LIFE OF A SUPERSONIC PROJECT OFFICER—Lloyd Mallan—*McKay*, 178 p., illus. with photographs by the author, $3.95. The beautiful photographs with which this book is filled were the cream selected from more than 4,500 film negatives.

EDUCATION FOR THE GIFTED: The Fifty-Seventh Yearbook of the National Society for the Study of Education, Part II—Nelson B. Henry, Ed.—*Univ. of Chicago Press*, 420 p., $4. It is expected, the editor indicates, that this yearbook will stimulate further advances in the improvement of educational opportunities for superior students.

ELECTRICAL PHENOMENA AND SOLID/LIQUID INTERFACE: Proceedings of the Second International Congress of Surface Activity, Volume III—J. H. Schulman, Ed.—*Academic*, 621 p., illus., $16.80 this volume, $50 for set of four volumes.

FEEDBACK THEORY AND ITS APPLICATIONS—P. H. Hammond—*Macmillan*, 348 p., illus., $7. For post-graduate engineering and physics students.

THE FIRST BOOK OF THE PANAMA CANAL—Patricia Maloney Markun—*Watts, F.*, 61 p., illus. with drawings by Lili Réthi, $1.95. A book for children about the building of the canal and some of its important engineering features.

FUNDAMENTAL CONCEPTS OF INORGANIC CHEMISTRY—Esmarch S. Gilreath—*McGraw-Hill*, 421 p., illus., $7.50. Text for advanced undergraduates.

THE GARDEN OF CHAPARRAL: Plants of the Lower Rio Grande Valley—Elizabeth M. Riess—*Vantage*, 158 p., illus., $3. An artist writes charmingly of flowers and leaves that enchanted her and the folklore associated with them.

GAS/LIQUID AND LIQUID/LIQUID INTERFACE: Proceedings of the Second International Congress of Surface Activity, Volume I—J. H. Schulman, Ed.—*Academic*, 521 p., illus., $15 this volume, $50 for set of four volumes.

GOVERNMENT-UNIVERSITY RELATIONSHIPS IN FEDERALLY SPONSORED SCIENTIFIC RESEARCH AND DEVELOPMENT—*Govt. Printing Office*, National Science Foundation, 44 p., graphs, paper, 40¢. Describing the evolution of Federal sponsorship of research and development at colleges and universities.

A GUIDE TO ENGINEERING EDUCATION—Frank W. Eller—*Teachers College*, Science Manpower Project Monograph, 45 p., paper, $1. To help high-school students and teachers find out who is qualified for careers in engineering.

I LIKE CATERPILLARS—Gladys Conklin—*Holiday House*, illus. with color drawings by Barbara Latham, $2.75. For little children.

JET PLANES WORK LIKE THIS—John W. R. Taylor—*Roy*, 63 p., illus., $2.75. For young people.

LANDING GEAR DESIGN—H. G. Conway—*Chapman (Macmillan)*, 342 p., illus., $12. For aeronautical engineers and students.

NUCLEAR RADIATION DETECTION—William J. Price—*McGraw-Hill*, 382 p., illus., $9. Gathering together the basic information on all the important nuclear-radiation detectors in use today.

NUCLEAR STRUCTURE—Leonard Eisenbud and Eugene P. Wigner—*Princeton Univ. Press*, 128 p., $4. A short descriptive summary. The treatment is largely non-mathematical.

PHARMACOLOGY IN MEDICINE: A Collaborative Textbook—Victor A. Drill, Ed.—*McGraw-Hill*, 2d ed., 1273 p., illus., $19.50. Recounting the desirable therapeutic actions, side effects and toxicity of new drugs as well as many of the older ones.

QUALITATIVE ANALYSIS: An Introduction to Equilibrium and Solution Chemistry—Therald Moeller—*McGraw-Hill*, 550 p., illus., $6.50. Intended to lead the student logically through needed theoretical concepts while simultaneously providing a background of interesting experimental work.

REACTOR CORE MATERIALS: A Review of Recent Developments in Solid Materials for Reactor Cores, Volume 1, Number 1—Batelle Memorial Institute—*Govt. Printing Office*, Atomic Energy Commission, 40 p., illus., paper, 55¢ per single copy, $2 per year. A quarterly for those who wish to keep abreast of developments in this field.

RUSSIAN-ENGLISH GLOSSARY OF ACCOUSTICS AND ULTRASONICS—P. Robeson, Jr.—*Consultants Bureau*, 193 p., paper, $10. Containing over 10,000 terms in these fields and also the English method of writing the names of scientists.

SCIENCE NEWS 47—Archie and Nan Clow, Eds.—*Penguin*, 141 p., illus., paper, 65¢. Containing articles of current scientific interest.

SOLID/GAS INTERFACE: Proceedings of the Second International Congress of Surface Activity, Volume II—J. H. Schulman, Ed.—*Academic*, 348 p., illus., $12.60 this volume, $50 for set of four volumes.

SOLID/LIQUID INTERFACE (WASHINGS, ETC.) AND CELL/WATER INTERFACE: Proceedings of the Second International Congress of Surface Activity, Volume IV—J. H. Schulmann, Ed.—

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Academic, 352 p., illus., $12.60 this volume, $50 for set of four volumes.

SYMPOSIUM ON RADIOISOTOPES—Charles E. Crompton and others—*Am. Soc. for Testing Materials*, 94 p., illus., $2.75. Use of radioisotopes in industry is saving hundreds of millions of dollars each year.

THERMODYNAMICS—Enrico Fermi—*Dover*, 160 p., paper, $1.75. Unabridged, unaltered reproduction of the 1937 edition of this modern classic.

TOPICS IN MICROBIAL CHEMISTRY: Antimycin, Coenzyme A, Kinetin and Kinins—F. M. Strong—*Wiley*, 166 p., illus., $5. Presenting a "capsule view" of several individual research projects.

VIBRATION CONTROL—John N. Macduff and John R. Curreri—*McGraw-Hill*, 465 p., illus., $9. Text for students of machine design.

WIND ATLAS OF THE NORTH PACIFIC—James W. McGary and Thomas M. Naito—*U. S. Fish and Wildlife Service*, Special Scientific Report—Fisheries No. 243, 35 p., illus., paper, free upon request direct to publisher, Washington 25, D. C. Wind is important to the fisherman because no matter how abundant the fish a good catch cannot be obtained when wind and water are adverse.

THE WORLD OF ENGINEERING—Frank Ross, Jr.—*Lothrop*, 186 p., illus., $3. Information for the young person who wants to know whether he should go into this profession.

Science News Letter, April 19, 1958

ICHTHYOLOGY

Deep-Swimming Whales Tangle With Cables

➤ WHEN A WHALE and submarine cable meet, the tangled, knotty results may spell disaster for the whale and broken communications for the telegraph company. However, they can also mean additional information for scientists on how deep a dive a whale can make.

A study of 14 cases of whales entangled in submarine cable lines shows that whales can withstand pressures at close to four-fifths of a mile down. Six of the reports describe finding whale carcasses or remains entangled in cable brought up from about 3,000 feet. The maximum depth mentioned is 3,720 feet. All whales positively identified were sperm whales.

Apparently the whales swim at these great depths in search of food. As they move through the water, jaws open and plowing through food-containing sediment on the ocean floor, the animals run the risk of collision with a cable. It also is possible whales attack slack cable, mistaking it for food.

Bruce C. Heezen, Lamont Geological Observatory, Palisades, N. Y., who reports on his study in the British journal *Deep-Sea Research*, says there is little doubt that whales caused the damage to cables. The way the cables were obviously mauled, the correlation between first reports of cable failure and the state of decomposition of the whale's body, and other factors such as location, depth and ocean currents all point to whales as the culprits.

Reports of whale entanglements off the coasts of Ecuador and Peru in March may be more evidence of the seasonal migration of sperm whales, Mr. Heezen says.

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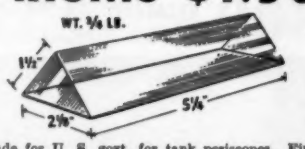

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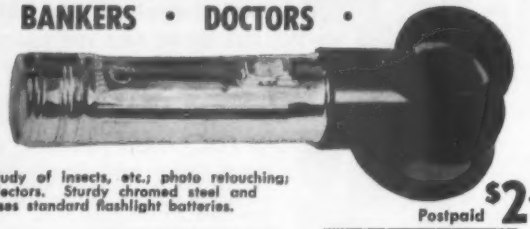

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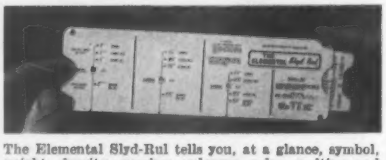

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Questions

BIOCHEMISTRY—What group of compounds in oat hulls is believed to contain a powerful protective against dental caries? p. 244.

CHEMISTRY—What do radar engineers mean by a "lossy" material? p. 245.

MEDICINE—How is salt intake related to high blood pressure, according to one scientist's studies? p. 247.

TECHNOLOGY—What are metachromic dyes? p. 250.

Photographs: Cover, R. G. LeTourneau, Inc.; p. 243, Highway Information Services; p. 245, North American Aviation, Inc.; p. 247, Ayerst Laboratories; p. 250, National Cash Register Company; p. 256, Leisure Industries.

ENGINEERING

Man Must Remain Part of Future Aircraft Systems

➤ MAN'S REASONING, judgment and adaptability to various situations are the three main factors that will keep the human element in airplanes of the future.

In addition to intellect, man has other properties that probably will not be replaced by automatic machines. The human body is more resistant to certain adverse flight conditions, such as vibration, heat and pressure, James W. Raeke, human engineering analysis section, Northrop Aircraft, Inc., told the Society of Automotive Engineers national aeronautic meeting in New York.

He warned, however, that aircraft planners must not over-rate man, and expect him to perform tasks beyond his ability "at a rate and in an environment dictated by the machine."

In some respects "man's tolerance to various stress conditions is quite critical," but his ability to adapt makes it desirable to include him as part of future aerial weapon systems.

Mr. Raeke said one of two approaches must be chosen: "either the man must give way to electronic control systems, or the limits of his tolerance must be found and aircraft performance programmed to stay within his capabilities."

Science News Letter, April 19, 1958

Do You Know?

Seismic soundings, the first ever made at the bottom of the world, proved that there is land above sea level at the *South Pole.*

The modern *lead* pencil is capable of drawing a line 35 miles long and can write an average of 45,000 words.

Probably the most significant recent advance in the recording of TV programs is the development of the magnetic video *tape recorder.*

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The Germans developed *atabrine,* a major anti-malaria drug in World War II.

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Chrome plated, adjustable, equipped with ratchet stop and lock nut. Adjustable for zero. Decimal equivalents of fractional sizes diesunk on frame. Recessed frame to allow readings in tight spots. Precision made for accurate readings, fully polished. In velvet lined case.

0-1", 1/1,000" Readings **$5.95** ppd.
1-2", 1/1,000" Readings with 1" test gauge **$7.95** ppd.

20 CAMEL HAIR Quality BRUSHES

Close-Out—Only 5¢ each

Precision crafted in West Germany. Perfect for artists, touching up around house, cleaning electrical and optical instruments and guns. Sizes range from fine #1 to full #5. Select camel hair firmly set in metal grip to give years of use. Worth many dollars, but ALL 20 yours for only ---------- **$1.00** ppd.

CLOSE-OUT SPECIAL!

SAVE $4.55 on Famous

ARCO-SAW

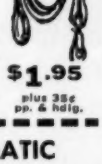
Reg. $12.50 OUR PRICE

with Precision Graduated Depth—Bevel—Rip Gages and 5" Arco Safecut Blade. **$7.95**

plus 50¢ pp. & hdlg.

Easily attached in less than a minute to any ¼" electric drill, this sensational gear-driven saw attachment will go thru 2x4's in one cut . . . 8 times faster than a handsaw! The 5" Sawblade will smoothly and rapidly whiz thru lumber, plywood, wallboard, etc. Comes with precision graduated DEPTH & LEVEL GAUGES for cuts to 1¾", bevels from 0 to 45 degrees; ADJUSTABLE RIP GAUGE; ADJUSTABLE VISUAL GUIDE; sturdy, easily adjusted SAFETY YOKE; WORM DRIVE CLAMP; RIGHT ANGLE GEAR DRIVE; ONE-PIECE GEAR BOX with steel gears and self-lubricating LIFETIME BEARINGS! Arco-Saw uses 30% less power; blade easily removed and resharpened with ordinary handfile! Ideal for rip, crosscut, mitre, dado and bevel cutting! Limited quantities at this LOW, LOW price.

Gov't Surplus WEBBED TOW CABLE



Originally made for U.S. Air Force. Never used. Test proven for towing trucks, cars, etc. 15 ft. long with extra heavy duty spring snap cable ⅝" wide. Nylon reinforced cable is ¼" thick and 1¾" wide at ends. Useful at home or keep in car for emergencies.

$1.95
plus 35¢ pp. & hdlg.

Vacu Jet AUTOMATIC BOAT BAILER $3.95 ppd.

Draws out 3 to 5 gallons of water a minute. Sucks out the last drop. Will not scratch or injure motor. Simple installation. No tools required. Fits any size motor. Hooks on to the motor in a jiffy, and when motor is started suction through the top draws water from the boat. It cleans as it bails and works like a genuine vacuum cleaner. Eliminates old fashioned hand method of bailing water. Fits easy in a tackle box. Weighs 10 ounces. Made of the finest plastic and vinyl tubing. No parts to wear or corrode. Fits any outboard motor except 3 h.p.

Complete Power Tool Accessory Set

100 PIECES

Designed for use in all ¼" capacity Electric Drills and Motor Chuck. A complete power tool accessory set that can handle almost any job of grinding, sawing, cutting-off, polishing, buffing, reaming, sanding, drilling, cleaning, etching, etc. KIT CONTAINS:—Wire Wheel, Mounted Grinding Wheels, Rotary File, Abrasive Cartridge Rolls, Circular Saw Blade, Felt Bob and Wheels, Honing Stones, Jewelers Rouge, Buffing Wheels, Midget Steel Cutters, Bristle Brushes, Abrasive Sheets and sufficient Arbors to accommodate all the unmounted items. Over $15 value ---------- only **$4.98** ppd.

Set of 10

MAGIC MAGNETS

These powerful permanently magnetized magnets—each the size of a jelly bean—lifts over ½ pound! Sewn into pot holders, towels or shower curtains—makes them securely cling to steel. Holds items on dashboard, metal files, demonstration or bulletin boards. Recover items from hard-to-get-at places. Pulls through glass, wood, paper, leather, plastic—anything but iron. All 10 rustproof magnets— **$1.00** ppd.

GOVERNMENT SURPLUS BELOW MFR'S COST

DUPONT NYLON CORDS

Light, strong, durable, quick-drying. Will not rot or mildew. Ideal for indoor or outdoor use. Camping, boating, hunting, clothes line and venetian blinds. Perfect for tent ropes, light anchors, deer cord, trout lines, crabbing, etc. Unused.

OUTWEARS ORDINARY ROPE 10 TO 1

NYLON BRAIDED CORD

1/16" dia., 100 lb. test, per ft. ---------- 1½¢
⅛" dia., 375 lb. test, per ft. ---------- 2¢
3/16" dia., 550 lb. test, per ft. ---------- 3½¢
In 50, 100, 200, 300, 400, 500 ft. & over lengths

NYLON BRAIDED LINE

¼" dia., 1,000 lb. test, olive drab, per ft. In 30, 40 & 50 ft. lengths only ---------- 3¢

NYLON ROPE

5/16" dia., 1900 lb. test, per foot ---------- 12¢
⅜" dia., 2700 lb. test, per foot ---------- 17¢
7/16" dia., 3800 lb. test, per foot ---------- 20¢

All in any length up to 1200 feet.

NYLON FISH LINE

Proven best by experienced fishermen. Heat stretched. Will not kink, twist or unravel. 25 lb. test, 300 ft. Reg. $1 per spool ---------- NOW 50¢

NYLON WEB STRAPS

with sturdy steel buckle

Perfect for passenger safety belts, luggage straps, car towlines, car carrying straps, boat trailer straps, etc. Tie heavy equipment and machinery with greater ease and safety . . . at far less cost. Just the thing for the garage or workshop.

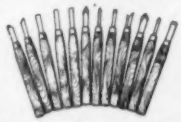
1" wide, 3000 lb. test, per foot ---------- 10¢
1¾" wide, 6000 lb. test, per foot ---------- 16¢
In 5, 6, 8, 10, 12 foot lengths

New! CALIBRATED LEVEL

No Guesswork! $2 ppd.

No bother with inexact "bubble-type" levels! Devil Level is calibrated for hairline accuracy. Needle points to exact degrees, inches anything is off level or plumb. Measures vert., horiz., all angles. Level pictures, shelves, tv antennas, etc. One side measures degrees off level, other, pitch or inch rise per ft. Fits in pocket. For hobbyists, handymen, housewives.

Surgical Steel — Hand Ground



Set of 12 CARVING KNIVES

$2.00 ppd.

The sharpest, keenest ground, surgical steel blades we have ever seen—sharp enough to split a human hair in two! 12 different shapes and edges can do every job of wood carving, model making, linoleum cutting, sculpting and whittling imaginable. Each blade has a 4½" long hardwood handle for easy gripping . . . heavy duty blade is firmly attached by means of a brass ferrule to insure long, continued rugged use. Each surgical steel blade precision hand ground to easily and quickly notch and cut any shape you wish. A sensational all-purpose set, well worth $5.95.

Lifetime Grit HANDY SANDER

Tungsten Carbide Grit Brazed on Steel

New lifetime abrasive miracle tungsten carbide grits brazed on steel gives a diamond-like cutting hardness. Perfectly finishes wood, plaster, plastic or composition materials. Ideal for dry wall joints, all types of wallboard. Never needs replacing—always stays sharp! Sands twice as fast as sandpaper—does not tear like sandpaper! Easily cleaned. Complete kit includes easy-hold birch sanding block, one coarse grit shoe and one fine grit shoe. Lifetime guaranteed.

$2.00
plus 20¢ pp. & hdlg.

BOLT CUTTERS

Easy working, positive action cutters to do the job intended. Made with black cast alloy steel handles; drop forged exchangable cutters. Compound leverage makes a difficult job easy.

12" size---------- $3.95 plus 25¢ pp. & hdlg.
18" size---------- $5.75 plus 25¢ pp. & hdlg.
24" size---------- $8.95 plus 35¢ pp. & hdlg.

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Order Today and Save. Minimum order $1.00. Send Check or M.O. C.O.D. orders plus fee. Money Back against risk.

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• New Machines and Gadgets •

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GLASS FIBER KITS for the home repairman can be used in the home, shop, garage or boathouse. The kits include a plastic glass and two sheets of a film that can be made into a "prefabricated" patch. The repair material will not rust or rot.

Science News Letter, April 19, 1958

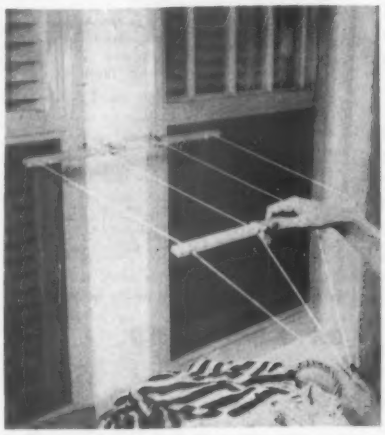
SPORTSMAN'S CHAIR doubles as a walking cane. The aluminum device is a cane when folded and a three-legged chair when opened. It weighs four pounds, has a nylon seat and stands 34½ inches high.

Science News Letter, April 19, 1958

GLASS CUTTER cuts in both directions. It has a natural diamond cut on both sides to provide a cutting edge in contact with the glass regardless of angle or direction. The cutter is fitted in an aluminum handle.

Science News Letter, April 19, 1958

CLOTHESLINES for indoor or outdoor use is portable. The dryer, shown in the photograph, is portable. The dryer eliminates the need for a permanent line by providing four parallel plastic lines with up to 55 feet of drying space. The hardwood



crossbars hook onto walls or posts without tools. The clothesline weighs one pound.

Science News Letter, April 19, 1958

RAZOR-TYPE SICKLE for lawn cutting and trimming has a replaceable blade made of razor blades. Nine blades in all form the garden tool cutting edge. The trimmer has a safety guard. It will take any double edge razor blade.

Science News Letter, April 19, 1958

TRANSPARENT TEMPLATE permits anyone to produce accurate plans and diagrams. A British invention, the template is fixed to a toggle hinge to form a pantograph and the whole is attached to a folded base.

Science News Letter, April 19, 1958

WOUND DRESSING FOR TREES is said to end "tar baby" pruning. The material sets quickly to form a smooth black seal against moisture and decay while natural healing is taking place. It is packaged in a 12-ounce push-button container.

Science News Letter, April 19, 1958

COMBINATION PHOTOGRAPHY HELPER unites a rangefinder and flash exposure meter. The rangefinder focuses from three to 100 feet. The exposure meter operates on the guide-number principle. The all-metal helper measures two and one-half inches long.

Science News Letter, April 19, 1958

Nature Ramblings

By HORACE LOFTIN

➤ THE LATINIZED scientific names for plants and animals sometimes seem most uninteresting, to say the least, at first glance. But if you look into the meaning of the Latin, you often find a nice description, a fanciful imagination at work, or even a bit of humor.

Take the name of the order of sea cows, Sirenia.

If you think back to your Homer, you will recall that the sirens were the irresistible seductresses of the sea who lured seamen to a disastrous end. Now, it is within the realm of reason that some ocean-weary sailor might mistake a basking sea cow weighing half a ton for one of these tempting maidens of the sea. Perhaps, however, the namer of this order was something of a humorist.

Although the animals superficially re-

Some Sirens!

semble the seals or walruses, sea cows are probably much closer kin to the elephants.

The order Sirenia is distinguished from all others by paddle-shaped forelimbs, in which the digits are all enclosed in a common covering of skin, and by the absence of hind limbs. They are totally aquatic. Even the young are born in the water.

How long can a sea cow, or manatee, stay under water? One ten-foot Florida sea cow averaged 12 minutes at a stretch under water, with 77 seconds for breathing in between. In emergencies, they can probably stay under much longer.

The birth of a sea cow has been witnessed, and the story of how the mother manatee taught her newborn the ways of living under water is a fascinating one.

Immediately after giving birth, the mother righted herself, bearing the calf on her back. In this way she kept the baby out of water for 45 minutes. She then sank slowly until only the calf's nose was above water. For about two hours more, the mother sea cow alternately lifted and lowered her offspring out of and into the water, each time shortening the stay out of water. Her next step was to submerge the calf completely for a short while. This act was carried on for another two hours. Result: at the end of this time, the baby sea cow appeared as happy under water as on top!

Science News Letter, April 19, 1958